TENNESSEE DEPARTMENT OF EDUCATION
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Distribution & Logistics I

Primary Career Cluster:	Transportation, Distribution & Logistics
Consultant:	Rachel Allen, (615) 532-2835, Rachel.Allen@tn.gov
Course Code(s):	6072
Prerequisite(s):	*Foundations of Distribution and Logistics* (6069)
Credit:	1
Grade Level:	10-11
Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation courses.
Programs of Study and Sequence:	This is the second course in the *Distribution & Logistics* program of study.
Necessary Equipment:	None
Aligned Student Organization(s):	Skills USA: http://www.tnskillsusa.com Brandon Hudson, (615) 532-2804, Brandon.Hudson@tn.gov
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit http://tn.gov/education/cte/work_based_learning.shtml.
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	503, 774
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/TransportationDistributionLogistics.shtml

Course Description

Distribution & Logistics I prepares students for entry into the warehouse and distribution career field. Course content emphasizes a deep understanding of the dynamics of distribution and logistics operations, the warehousing skills needed for the tracking and managing of inventory, and the problem-

solving skills used by logisticians in today's complex business environments. Upon completion of this course, a proficient student will be have a thorough understanding of safety, tools, equipment, operations, processes, customer fulfillment, product lifecycle, future trends, and regulatory issues in the industry. Standards in this course are aligned with Tennessee State Standards for English Language Arts & Literacy in Technical Subjects and Tennessee State Standards in Mathematics.*

Program of Study Application

This is the second course in the *Distribution & Logistics* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Transportation, Distribution & Logistics website at http://www.tn.gov/education/cte/TransportationDistributionLogistics.shtml.

Course Standards

Occupational Safety

1) Demonstrate the ability to comply with personal and environmental safety practices associated with the appropriate handling and storage methods of materials in accordance with local, state, and federal safety and environmental regulations.
    a. Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards, and regarding emergency response procedures.
    b. Interpret Material Safety Data Sheets (MSDS) to determine any hazards related to materials handled. Use appropriate signs and symbols to identify hazardous materials within warehouses and during transportation of the materials.
    c. Maintain a portfolio record of written safety examinations and equipment examination for which the student has passed an operational checkout by the instructor.
    d. Identify dangerous goods and be able to discuss how they influence warehouse and transportation decisions; and determine the appropriate corrective actions if faced with a hazardous situation, as outlined by the *Emergency Response Guidebook* published by the U.S. Department of Transportation.

    (TN Reading 3, 4; TN Writing 4)

Logistics & Transportation

2) Research the four subdivisions of logistics in light of organizational management practices and prepare an explanatory paper or presentation that discusses the similarities and differences between the subdivisions:
    a. Business logistics
    b. Military logistics
    c. Event logistics
    d. Service logistics

    (TN Reading 1, 4; TN Writing 2, 4, 6, 7, 9)

3) While variations exist from organization to organization, the following functions are often included under the logistics umbrella. Synthesize information from textbook(s), print and online industry sources to describe each. Create a graphic illustrating how they interact with one

another and write an accompanying explanatory narrative that indicates how each affects product costs and profitability.

a. Transportation
b. Warehouse and storage
c. Intermodal freight transport
d. Materials handling
e. Inventory control
f. Order fulfillment
g. Inventory forecasting
h. Production planning/scheduling
i. Customer service
j. Facility location
k. Return goods handling
l. Parts and service support
m. Salvage and scrap disposal

(TN Reading 1, 4, 7; TN Writing 2, 4, 6, 7, 9)

4) Describe the tradeoffs that occur between transportation and inventory costs. Drawing on examples from real products and companies, explain when it is more profitable to use more expensive transportation and maintain smaller inventory, and when it is more advantageous to use cheaper transportation and maintain larger inventories. Discuss the application of key concepts such as Just-in-Time (JIT) strategy, lean dynamics, and Kanban systems. (TN Reading 1, 4, 7, 8; TN Writing 1, 4, 8)

5) Demonstrate the ability to calculate and explain to others the purchase cost, ordering cost, and holding cost for a given material or product within the supply chain. Determine total cost as a function of these costs and demonstrate the effects on profit for a specified price and quantity. (TN Reading 3, 4; TN Math N-Q, A-CED, F-IF, F-BF)

6) Perform inventory calculations to minimize costs as would a logistics manager for a given company. Using algebraic reasoning and appropriate units, determine the economic order quantity (EOQ) and reorder point (ROP) for a given product. Research forecasting models for the specified product and to understand how companies predict EOQ and ROP using logistics management. (TN Reading 3, 4, 9; TN Math N-Q, A-CED, F-IF, F-BF)

Warehousing

7) Compare and contrast the warehousing requirements for a variety of different products including items such as perishable foods, hazardous chemicals, large items like furniture and appliances, school supplies, seasonal items, and subassemblies for the manufacture of a given product. (TN Reading 1; TN Writing 4, 7, 8)

8) Write an informative report describing different warehouse layouts and equipment used to move materials in each. Differentiate between bulk and rack storage, and indicate situations when each is employed. List the three categories of aisle spacing and describe the advantages and disadvantages of each. (TN Reading 1, 4; TN Writing 2, 4, 7)

9) Investigate various warehouse management system (WMS) software programs and create a comparison chart that could be used by a warehouse manager to select software to meet the specific needs of his/her operation. (TN Reading 1, 4, 7; TN Writing 2, 4, 8)

10) Demonstrate the ability to complete and interpret warehouse documents including, but not limited to, packing slips, bills of lading, advance shipment notices, distribution sheets, pick lists, invoices, special orders, and inventory forms. (TN Reading 3, 4, 5, 6)

Regulations

11) Create a chart listing international, national, state, and local agencies and organizations that regulate some part of the supply chain and the role played by each. Indicate what areas each agency has jurisdiction over. Example agencies include:
    a. U.S. Department of Transportation (DOT)
    b. U. S. Customs and Border Protection (CBP)
    c. Homeland Security (HS)
    d. Environmental Protection Agency (EPA)
    e. Occupational Safety and Health Administration (OSHA)
    f. World Shipping Council
    g. United Nations, including the International Maritime Organization (IMO)
    h. International Organization for Standardization (ISO)
    i. World Customs Organiations (WCO)
    j. City and county laws and ordaninces
    k. State laws

    (TN Reading 1, 4; TN Writing 2, 4, 8)

12) Analyze the impact of international trade agreements on logistics decisions. (TN Reading 1, 2, 4; TN Writing 7, 8, 9)

13) Research International Commercial Terms, also known as INCOTERMS®, developed by the International Chamber of Commerce. Create a table or chart to indicate what each of the three letter standard terms means by delineating the respective obligations of the buyer and seller involved in the delivery of goods from the Seller to the Buyer. (TN Reading 4; TN Writing 4)

Problem Solving

14) Solve given problems related to transportation of goods and warehousing by evaluating data and presenting solutions or recommending appropriate decisions. Use spreadsheets and/or other software in calculating "what if" scenarios as appropriate. Types of problems should include scenarios such as:
    a. Selecting routes and modes of transportation between a distribution center and various markets
    b. Calculating the carbon footprint of similar products shipped from different locations and by different modes of transportation
    c. Optimizing warehouse usage
    d. Planning for the moving and handling of hazardous goods
    e. Analyzing the impact of natural disasters on supply chain

f. Developing strategies for working toward the sustainable use of specific materials and modes of transporation

(TN Reading 3, 4; TN Writing 4, 7, 8; TN Math N-Q, A-CED, F-IF, F-BF)

15) Given a selected case, plan for the storage, movement, and delivery of a specified good or service from one location to another. Using logistics data and applying concepts learned in the course, justify the tradeoff decisions (i.e., mode of transport, holding time, delivery constraints such as fuel cost) in the proposed plan, coherently explaining the logic behind each choice as if presenting to a senior manager. For example, outline the plan for fulfilling an order for a personal computer by a fixed date and transporting it through customs to a purchaser in a foreign country. (TN Reading 3; TN Writing 1, 4, 7, 8, 9; TN Math N-Q, A-CED, F-IF, F-BF)

Trends

16) Analyze case studies of the logistics operations of various retail companies to see how they plan for and adjust their operations to remain competitive with companies such as Amazon, WalMart, and Kroger. (TN Reading 1, 4; TN Writing 4)

17) Using websites and journals from professional organizations related to transportation, distribution, and logistics, identify five trends that are impacting local, regional, national, and international supply chains. Trends could include such factors as rising fuel costs, movements toward fully automated warehouses, and greening the supply chain. Summarize research in an informative essay that includes:
    a. description of the trend and explanation of how it affects the supply chain,
    b. examples of how various businesses are responding to the trend, and
    c. an outline of the information that must be considered before a business implements any change, including a formal cost-benefit analysis.

    (TN Reading 1, 4, 8; TN Writing 2, 4, 6, 7, 8)

Project

18) Work with a local business to analyze its supply chain. Create a report and presentation with graphics and map(s) that depicts both the incoming supply chain and outgoing supply chain. Indicate what modes of transportation and types of warehousing operations it uses. Outline changes that it has made or plans to make in its supply chain and why it made/will make them. (TN Writing 2, 4, 6)

Standards Alignment Notes

*References to other standards include:

- TN Reading: Tennessee State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 11-12 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 5, 6, and 10 at the conclusion of the course.

- TN Writing: Tennessee State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 11-12 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5, and 10 at the conclusion of the course.
- TN Math: Tennessee State Standards for Mathematics: Math Standards for High School: Number and Quantity, Algebra, Functions.
    - Note: The standards in this course are not meant to teach mathematical concepts. However, the concepts referenced above may provide teachers with opportunities to collaborate with mathematics educators to design project based activities or collaborate on lesson planning. Students who are engaging in activities listed above should be able to demonstrate quantitative, algebraic, and functional reasoning as applied to specific technical concepts. In addition, students will have the opportunity to practice the habits of mind as described in the eight Standards for Mathematical Practice.
- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
    - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.
- *Emergency Response Guidebook:* http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/ERG2012.pdf